

Appendix A

Interpretation of Comprehensive Environmental Response, Compensation, and Liability Act Criteria for the Pit 9 Remediation Project Retrieval Process

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Interpretation of Comprehensive Environmental Response, Compensation, and Liability Act Criteria for the Pit 9 Remediation Project Retrieval Process

Table A-1 contains a detailed interpretation of “Comprehensive Environment Response, Compensation, and Liability Act” (42 USC § 9601 et seq., 1980) criteria for the Pit 9 Stage III retrieval process. This interpretation includes subcriteria and definitions of applicability to the Stage III retrieval process and the project requirement of potential applicability to other transuranic burial pits and trenches within the Subsurface Disposal Area at the Radioactive Waste Management Complex of the Idaho National Engineering and Environmental Laboratory.

Table A-1. Pit 9 Remediation Project retrieval method evaluation criteria.

No.	CERCLA Criteria	Subcriteria		Weight	Description	Comments
		Level 1	Level 2			
1	Long-term effectiveness and permanence	—	—	—	—	—
1a		Magnitude of residual risk.			Residual risk from contamination remaining in or returned to pit.	Contamination spread during retrieval and handling is a primary driver for the amount of material that will be returned to the pit, including both the volume of waste and the total curies of plutonium. Contamination spread in waste during retrieval and handling is also a factor for other criteria.
		—	Contamination spread to clean overburden.	—	—	—
		—	Contamination spread within waste.	—	—	—
		—	Contamination spread to clean underburden.	—	—	—
1b		Adequacy and reliability of controls.	—	NA	NA	No long-term monitoring planned. Cap over pit will be planned for all options.
2	Reduction of toxicity, mobility, and volume	—	—	—	—	Criterion is applicable primarily to treatment function, not retrieval. Applicable criteria for retrieval are listed.
2a		Degree to which treatment is irreversible.	—		How easily material remaining in or returned to the pit can be retrieved and treated again in the future.	Low-weighted criteria. Additional treatment of waste not expected.

Table A-1. (continued).

No.	CERCLA Criteria	Subcriteria		Weight	Description	Comments
		Level 1	Level 2			
2b		Type and quantity of residuals remaining after treatment.	—		Type and quantity of secondary waste. This is a function of amount of equipment and material that will require disposal and the contamination levels on equipment and materials.	Long-term effectiveness and permanence criterion covers materials remaining in or returning to pit. Materials that may be added to the waste from retrieval operations (e.g., hydraulic fluid) also are considered.
		—	Volume of secondary waste generated.	—	—	—
		—	Contamination levels of secondary waste.	—	—	—
2c		Protection from contamination spread to environment.	—	—	Capabilities of contamination-control methods, including dust control methods, confinement structures, and filtered ventilation systems.	—
3	Short-term effectiveness	—	—	—	—	—
3a		—	—	—	—	—
		—	Ability to meet project schedule.	—	—	—
		—	Duration of retrieval operations.	—	Time the pit is open and duration of retrieval operations.	—
3b		Community protection.	—	—		—
3c		Worker protection.	—	—	Through project life-cycle—construction, operations, maintenance, emergencies, and D&D&D.	—
		—	—	—	—	—
		—	—	—	—	—

Table A-1. (continued).

No.	CERCLA Criteria	Subcriteria		Weight	Description	Comments
		Level 1	Level 2			
		—	Protection from hazardous chemicals.	—	—	—
		—	Protection from industrial hazards.	—	Includes confined space entry, fire, and explosion.	—
3d		Environmental impacts.	—	NA	—	Short-term environmental impacts from the life-cycle activities are expected to be essentially equal for all options.
4	Implementability	—	—	—	—	—
4a		Technical feasibility.	—	—	—	—
		—	Constructability.	—	—	—
		—	Operability.	—	—	—
		—	Reliability.	—	—	—
		—	Ease of undertaking additional remedial actions, if necessary.	NA	—	Covered under Criterion 2a.
4b		Administrative feasibility.	—	—	Ability to obtain approvals from other agencies.	—
4c		Availability of services and materials.	—	—	—	—
		—	Availability of workers.	—	Includes qualified operators, radiological and safety personnel, and specialists.	—
		—	Availability of utilities.	—	Water and electricity.	—
		—	Availability of disposal facilities.	—	—	This criterion is primarily for disposal of secondary wastes at ICDF. May also include possibility of disposal at other sites or back into Pit 9.

Table A-1. (continued).

No.	CERCLA Criteria	Subcriteria		Weight	Description	Comments
		Level 1	Level 2			
4d		—	Availability of equipment.	—	—	—
		Impact on treatment process and facility.		—	—	—
5	cost		—	—	Life-cycle costs.	—
		Construction.	—	—		—
		Operations.	—	—		—
		Maintenance.	—	—		—
		D&D&D.	—	—		—
6	Applicability to other TRU waste pits and trenches withm SDA	—	—	—	Includes applicability of basic processes, equipment design, and facility design to other pits and trenches to be excavated at the SDA.	—

CERCLA = Comprehensive Environment Response, Compensation, and Liability Act (42 USC § 9601 et seq., 1980)

D&D&D = deactivation, decontamination, and deconmissioning

ICDF = INEEL CERCLA Disposal Facility

INEEL = Idaho National Engineering and Environmental Laboratory

OU = operable unit

SDA = Subsurface Disposal Area

TRU = transuranic

References

42 USC § 9601 et seq., 1980, “Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA/Superfund),” *United States Code*.

Appendix B
Equipment and Structure Options—By Function

Appendix B

Equipment and Structure Options—By Function

The list of feasible equipment for excavation and transport of pit material and the options for confinement structures for the Pit 9 Remediation Project at the Idaho National Engineering and Environmental Laboratory, provided by the design team to initiate the VE session, are provided in this appendix. The following lists were developed through the project technology search phase.

B.1 EXCAVATION

The function of this equipment is to perform excavation operations.

1. Backhoe (mobile with wheels or tracks, or on rails)
2. Front-end loader (FEL) (mobile with wheels or tracks, or on rails)
3. Excavator with FEL and backhoe (mobile with wheels or tracks, or on rails)
4. Dragline
5. Electric or hydraulic shovel
6. Bobcat
7. Holland loader
8. Truck crane
9. Overhead crane
10. Easy miner
11. Continuous miner
12. Roadheader
13. Pavement cutter
14. Mucking machine
15. Highwall miner
16. Vacuum
17. Scraper.

B.2 TRANSPORT

The function of the equipment listed below is to remove material from Pit 9 and then to return material.

1. Excavation equipment (from above) conveys material
2. Forklifts (rough or smooth terrain)
3. Excavation equipment or forklift with trays or integrated transfer modules
4. Conveyors (belt, apron, roller, slat)
5. Overhead conveyors
6. Stacker
7. Overhead crane
8. Mobile crane
9. Bulldozer or scraper
10. Dump truck
11. Trailer behind equipment
12. Rail cars
13. Automatic guided vehicles
14. Cascading conveyor cars.

B.3 CONFINEMENT

The function of the equipment listed below is to provide confinement for project operations

1. Large, open, primary and secondary confinement
 - a. Large, independent, primary and secondary structures over entire pit
 - b. Large structure over entire pit with primary and secondary skins on one structure
2. Large primary and secondary confinement with internal contamination-control walls
 - a. Large structure with moveable contamination-control walls
 - (1) Rigid and extendable
 - (2) Flexible curtains
 - (3) Rigid walls in building, and curtain in pit

- b. Large structure with permanent contamination-control walls or curtains
 - (1) Sheet piles through waste with matching permanent walls in building
 - (2) Walls in building and curtain in pit
 - (3) Walls in building, extendable into pit
- c. Small, moveable, primary with large secondary
- 3. Small, moveable, primary and large secondary
- 4. Small, moveable, primary and secondary
- 5. Very small moveable primary and secondary
- 6. No confinement.

Appendix C

Option List Table from Value Engineering Session

Appendix C

Option List Table from Value Engineering Session

Appendix C contains information developed from the value engineering session for options considered for the Pit 9 Remediation Project retrieval process at the Subsurface Disposal Area within the Radioactive Waste Management Complex at the Idaho National Engineering and Environmental Laboratory. Table C-1 pertains to confining hazards. Table C-2 pertains to excavating waste and soil. Table C-3 pertains to removing material from Pit 9 and then returning it to the pit.

Table C-1. Options analysis for the confine-hazard function.

Option	Concepts to Accomplish Confine-Hazard Function	Viable?
1	Large, clear-span primary and secondary confinement over entire pit.	
	a. Large, independent primary and secondary structures over entire pit	√
	b. Large structure over entire pit with primary and secondary skins on one structure	√
	c. Low-roof concept.	—
2	Large primary and secondary confinement with internal contamination-control walls.	—
	a. Large structure with moveable contamination-control walls	
	b. Rigid and extendable (very complex)	√
	c. Flexible curtains.	
3	Rigid walls in building or curtain in pit.	—
	a. Large structure with permanent contamination-control walls or curtains	
	b. Sheet piles through waste with matching permanent walls in building	√
	c. Walls in building and curtain in pit	
	d. Walls in building, extendable into pit.	
4	Small, moveable, primary, and large secondary.	√
5	Small, moveable, primary, and secondary.	—
6	Very small, moveable, primary and secondary.	—
7	No confinement (includes weather enclosure and worker in sealed cabin).	—
8	Geotextile membrane with soil underneath. Mine from below.	—
9	No confinement. Mine and allow underburden to collapse as work proceeds.	—
10	Underground mine and shore the roof.	—
11	Grout overburden in place and support from above (truss).	—
12	Secondary only.	—
13	Magnetic bottle or box.	—
14	Leave the waste and soil in place	—

Table C-1. (continued)

Option	Concepts to Accomplish Confine-Hazard Function	Viable?
15	Install a concrete (structural) slab over the pit before excavation.	—
16	Small moveable fabric structure for contamination control (tent).	—
17	Foam dome that can be dissolved later with solvent.	—
18	Large (14-in.) auger.	—
19	Caissons (tube).	—
20	Double wall air supported internal structure.	—
22	Freeze the ground.	—
23	Fluidized dig face (use paraffin).	—
24	Roll out plastic to cover the ground not being worked.	—

Table C-2. Options analysis for the function to excavate waste and soil.

Option	Concepts to Accomplish Excavate-Waste-and-Soil Function	Viable ?
1	Backhoe (mobile with wheels or tracks, or on rails)	√
2	FEL (mobile with wheels or tracks, or on rails)	√
3	Excavator with FEL and backhoe (mobile with wheels or tracks, or on rails)	√
4	Dragline	—
5	Electric or hydraulic shovel	√
6	Bobcat	√
7	Holland loader	—
8	Truck crane	—
9	Overhead crane	√
10	Easy miner	—
11	Continuous miner	—
12	Roadheader	—
13	Pavement cutter	—
14	Mucking machine	—
15	Highwall miner	—
16	Vacuum	—
17	Scraper	—
18	Coat the dig face as you excavate	—
19	Auger	—
20	Brush or shred at the face and use a vacuum to collect the soil	—
21	Tunnel boring machine, slurry the pit, and pump the slurry out	—
22	Chain excavator with a bucket (large ditch witch)	—
23	Remove small amounts of waste at the dig face to make sorting more efficient	—
24	Caisson with auger	—
25	Hydraulic cookie cutter	—
26	Shear for size reduction	—
27	Freeze and cut	—
28	Pulverize and slurry to excavate and contain contamination	—
29	Membrane with access points to extract soil. Keep membrane pressed against the soil at all times. Never expose digface.	—
30	Sluce the pit with borated water or acid	—
31	Hydraulic clam shell on a crane	√
32	Clamshell idea with shredder and conveyor to treatment area	—

FEL = front-end loader

Table C-3. Options analysis for the transport-material function (remove material from pit and return material).

Option	Concepts to Accomplish Transport Material Function	Viable ?
1	Bobcat	√
2	Forklifts (rough or smooth terrain)	√
3	Excavation equipment or forklift with boxes trays or integrated transfer module	√
4	Covered conveyors (belt, apron, monorail, roller, slat)	√
5	Overhead conveyors	—
6	Stacker	—
7	Overhead crane (with clamshell, cookie cutter, or grapple)	√
8	Mobile crane	√
9	Bulldozer or scraper	—
10	Dump truck	—
11	Trailer behind equipment	—
12	Rail cars	—
13	AGVs	√
14	Cascading conveyor cars	—
15	Lazy Susan or revolving door	—
16	Backhoe bucket or big fork with slots to screen out dirt as it digs	—
17	FEL	√
18	Remove waste from above and return the waste from below	—
19	Waste egress tunnel	—
20	Enclosed conveyer	—
21	Linked sausage (cookie cutter in sleeves)	—
22	Funnel concept: box under a funnel with directed airflow	—
23	FEL with a flip-over lid	—
24	Pneumatic transfer	—
25	Potato auger and conveyor that digs and transports	—
26	Monorail system	—
27	Slurry, pump, and pick up large objects	—
28	Use an airlock or interlock to receive waste and boxes from treatment	—

AGV = automatic guided vehicle

FEL = front-end loader

Appendix D

Subteam Tables

Appendix D

Subteam Tables

The table in this appendix contains options and scores assigned to the criteria evaluated by the value engineering subteam.

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A LARGE OPEN PRIORITY - ABOVE GRADE RETREAT EVAL									March 25, 2003
ITEM	EXCAVATION	TRANSPORT	Floor-Waste Boxes-Dirt	CRITERIA & WEIGHT					SCORE
				Cross Contamination 2	Contamination Spread 5	Implement- ability 3	Cost, Life Cycle 3	Schedule Risk 4	
A	Backhoe (both dribble)	FEL	Backhoe- forklift-FEL	2	2	3	4	5	55
	(small bucket more x- contamination)			FEL can't take all OB - waste won't support weight	x-fert in lg bldg no confine	Clearance problems, FEL tx on uneven ground	d/d a bit higher than small bldg, but no d/d to move	no bldg move	
B	Backhoe > 5x5x10 box	OH crane to roller conveyor	backhoe-OH crane-Dirt Bin	4	3	4	3	5	64
				less dribble, but small scoop		big crane - move lg objects	more equipment	building	
C	Backhoe > Box	forklift	Backhoe- forklift-FEL	3	2	3	3	5	54
D	Backhoe > Box	Backhoe > Roller Conveyor	backhoe-OH crane-Dirt Bin	4	2	0	3	5	0
						backhoe is setting box on interface conveyor is very difficult			
E	Backhoe > Box	forklift > Roller Conveyor	backhoe-OH crane-Dirt Bin	4	3	2	3	5	58
						forklift setting box on interface conveyor is difficult			

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A LARGE OPEN PRIMARY - ABOVE GRADE RETRIEVAL									March 25,2003
ITEM	EXCAVATION	TRANSPORT	Floor-Waste Boxes-Dirt	CRITERIA & WEIGHT					SCORE
				Cross Contamination	Contamination Spread	Implement-ability	Cost, Life Cycle	Schedule Risk	
				2	5	3	3	4	
F	Backhoe > Backhoe Rehandle	Hopper & Belt Conveyor	Backhoe-forklift-backhoe	2	1	1	3	5	41
							size of objects		
G	OH crane with Hyd clamshell & Grapple	Hopper / Conveyor	Clamshell-OH crane-Dirt Bin	2	1	1	3	5	41
H	OH crane with Hyd clamshell & Grapple	Box / Crane / Conveyor	Clamshell-OH crane-Dirt Bin	2	3	1	3	5	51
				poor control, dribble					
I	Mob Crane with Hyd clamshell & Grapple	Box / Crane / Conveyor	Clamshell-OH crane-Dirt Bin	1	1	1	3	3	31
J	FEL/Backhoe Combination	FEL/Backhoe Combination	Backhoe-forklift-FEL	1	1	2	4	5	45
				small machine					
K	FEL/Backhoe Combination	Box / Crane / Conveyor	Backhoe-forklift-Dirt Bin-FEL	1	1	2	3	5	42
L	OH crane Z-mast - Cookie Cutter	Box / Crane / Conveyor	Cutter-OH crane-Dirt Bin	-	-	0	-	-	0

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B LARGE OPEN PRIMARY - BELOW GRADE RETRIEVAL				March 25,2003					
ITEM	EXCAVATION	TRANSPORT	FLOOR-WST. BOXES-DIRT	CRITERIA & Weight					SCORE
				Cross Contamination	Contamination Spread	Implement- ability	Cost, Life Cycle	Schedule Risk	
				2	5	3	3	4	
A	FEL & Backhoe (both dribble)	FEL	FEL-forklift-FEL	5	3	5	4	5	72
B	Backhoe > 5x5x10 box	OH crane to roller conveyor	backhoe-OH crane-Dirt Bin	1	1	4	3	5	48
C	Backhoe > Box	forklift	backhoe-forklift- Dirt Bin-backhoe	1	1	4	4	5	51
D	FEL & Backhoe > Box	forklift	backhoe-forklift- Dirt Bin-backhoe	3	2	3	3	5	54
E	Hydraulic Shovel > Box	forklift	Sh'vl-forklift-Dirt Bin-Shvl	3	2	3	3	5	54
F	Hydraulic Shovel > Box	OH crane to roller conveyor	Sh'vl-OH crane- Dirt Bin	3	3	3	3	5	
G	Bobcat Loader	Bobcat Loader	Bobcat-Forkloft- Backhoe	1	1	1	3	4	35
H	Bobcat Loader	forklift	Bobcat-Forkloft- Backhoe	1	1	1	3	4	35
I	FEL/Backhoe Combination > Box	forklift	FEL/backhoe- forklift- FEL/backhoe	1	1	2	4	5	45
J	FEL/Backhoe Combination > Box	OH crane to roller conveyor	FEL/backhoe-OH crane-Dirt Bin	1	1	2	3	5	42

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B LARGE OPEN PRLMARY - BELOW GRADE RETRIEVAL									March 25, 2003
ITEM	EXCAVATION	TRANSPORT	FLOOR-WST. BOXES-DIRT	CRITERIA & Weight					SCORE
				Cross Contamination 2	Contamination Spread 5	Implement- ability 3	Cost, Life Cycle 3	Schedule Risk 4	
K	FEL/Backhoe Combination	FEL/Backhoe Combination	FEL/backhoe- forklift- FEL/backhoe	1	1	2	4	5	45

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LARGE OPEN PRIMARY WITH MOVEABLE WALLS							March 25, 2003
More duct work will be needed and will be more complicated due to moveable walls. 10-11 air changes per hour may be needed. 360,000 cfm. 1000 cfm per 2X2 filter (4 sq ft). Use different containment to provide relief for HVAC permeability of over burden is low. Hard to keep the dirt moist to a significant depth. (Dust issues) Top 1 or 2 in. can be kept wet, but equipment will stir it up. May have to bring in rock right away as a driving surface. Ability to control contamination to immediate area that is open is preferred. May need a conditioning system along with HVAC system. Getting soil to 15% is the goal, but air in building will dry it out. Humidity levels and sprays will have to be used.							
ITEM	EXCAVATION	TRANSPORT	Floor-Waste Boxes-Dirt	CRITERIA & WEIGHT			
				Cross Contamination	Contamination Spread	Implement-ability	Cost, Life Cycle
				2	5	3	3
							4
ABOVE GRADE							
A	Backhoe (on top)	FEL	Backhoe-forklift-FEL	2	3	2	3
		(Below grade)					5
B	Backhoe > 5x5x10 box	OH crane to roller conveyor	backhoe-OH crane-Dirt Bin	4	4	2	3
						Two cranes are needed. Complicated	5
C	Backhoe > Box	forklift	Backhoe-forklift-FEL	3	3	2	3
					forklift kicks up dust		5
D	Backhoe > Box	Backhoe > Roller Conveyor	backhoe-OH crane-Dirt Bin	4	2	0	3
							5
							0

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C	LARGE OPEN PRIMARY WITH MOVEABLE WALLS							March 25, 2003		
E	Backhoe > Box	forklift > Roller Conveyor	backhoe-OH crane-Dirt Bin	4	4	0	3	5	0	
		Has to go through the wall.								
F	Backhoe > Backhoe Rehandle	Hopper & Belt Conveyor	Backhoe-forklift-backhoe	2	1	0	3	5	0	
	Dumps to a pile pick up by another backhoe.	Curtains don't help you unless the conveyor is covered.								
G	OH crane with Hyd clamshell & Grapple	Hopper / Belt Conveyor	Clamshell-OH crane-Dirt Bin	2	1	0	3	5	0	
	Crane is outside the curtain.									
H	OH crane with Hyd clamshell & Grapple	Box OH crane	Clamshell-OH crane-Dirt Bin	2	3	1	3	5	51	

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C	LARGE OPEN PRIMARY WITH MOVEABLE WALLS						March 25, 2003		
						Can dribble over dirty area.	Hard to get the clamshell to dig and get bulky objects. Hard to move objects that need to remain in place.		
I	Mob Crane with Hyd clamshell & Grapple	Box / Crane / Conveyor	Clamshell-OH crane-Dirt Bin	1	1		0	3	0
J	FEL/Backhoe Combination	FEL/Backhoe Combination	Backhoe-forklift-FEL	1	2		Not enough room for mobile crane.	4	47
K	FEL/Backhoe Combination	Box / Crane / Conveyor	Backhoe-forklift-Dirt Bin-FEL	1	3			3	52
L	OH crane Z-mast - Cookie Cutter	Box / Crane / Conveyor	Cutter-OH crane-Dirt Bin	-	-		Smaller area to move around in.	-	0

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C		LARGE OPEN PRIMARY WITH MOVEABLE WALLS				March 25, 2003			
BELOW GRADE									
AA	FEL & Backhoe	FEL	FEL-forklift-FEL	5	4	4	4	5	74
				Idea: Recirculate the air within the building and don't connect the ducts. All you do is control a boundary that is not a primary. You don't have to meet the same standard. (Brent Helm) It is just a contamination control barrier. Big moveable dust collector.		Could use a fabric roll-up door or use an air-lock. Bit more complicated.			
BB	Backhoe > 5x5x10 box	OH crane to roller conveyor	backhoe-OH crane-Dirt Bin	1	2	3	3	2	38
				When you dump into an open box, you generate dust.	Complicated and series of drop-off points for the box.			Boxes coming in and out and crane handling and maintenance.	

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C LARGE OPEN PRIMARY WITH MOVEABLE WALLS							March 25, 2003		
CC	Backhoe > Box	forklift	backhoe-forklift-Dirt Bin-backhoe	1	2	3	4	5	53
						Have to go through walls, but should not be an issue.			
DD	FEL & Backhoe > Box	forklift	backhoe-forklift-Dirt Bin-backhoe	3	3	3	3	5	59
	Big loader and small backhoe loading work. Backhoe helps where needed.			Big bucket to do digging.	Have walls in building.	Same as CC.			
EE	Hydraulic Shovel > Box	forklift	Sh'vl-forklift-Dirt Bin-Shvl	3	3	3	3	5	59
						Same forklift going through door. Loading box with shovel.			
FF	Hydraulic Shovel > Box	OH crane	Sh'vl-OH crane-Dirt Bin	3	4	2	3	5	
						series of blisters and air locks. Hard to use a crane with moveable walls.			
GG	Bobcat Loader	Bobcat Loader	Bobcat-Forkloft-Backhoe	1	2	1	3	4	40
HH	Bobcat Loader	forklift	Bobcat-Forkloft-Backhoe	1	2	1	3	4	40

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C	LARGE OPEN PRIMARY WITH MOVEABLE WALLS					March 25, 2003			
II	FEL/Backhoe Combination > Box	forklift	FEL/backhoe- forklift- FEL/backhoe	1	2	2	4	5	50
						You don't have a good piece of equip to handle big pieces of equipment. Working around large objects in place. More complicated with walls in place.			
JJ	FEL/Backhoe Combination > Box	OH crane to roller conveyor	FEL/backhoe-OH crane-Dirt Bin	1	2	1	3	5	44
KK	FEL/Backhoe Combination	FEL/Backhoe Combination	FEL/backhoe- forklift- FEL/backhoe	1	2	2	4	5	50
						Walls don't make this harder or easier.			

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D LARGE OPEN PRIMARY WITH PERMANENT WALLS March 25, 2003									
Notes: Permanent walls good idea for above grade with portable equipment. Use sheet piles. Not good for portable equipment below grade. One permanent wall is basically same as one building. Two air systems, but only one as to run at a time. Does give you some flexibility and some LCC benefits. Could return material to Pit as a separate operation. Requires two sets of equipment (clean and dirty). If you divide it into four sections with permanent walls, then like the moveable walls. This is easier to build and reduces size of air system. Would use about the same equipment as moveable walls. Assume for this evaluation - two permanent walls (3 sections at 160' each).									
	Easier HVAC system than movable, smaller than open primary.		This is essentially performing the project 3 times, with 3 sets of non-portable equipment.						
				CRITERIA & WEIGHT					
ITEM	EXCAVATION	TRANSPORT	Floor-Waste Boxes-Dirt	Cross Contamination	Contamination Spread	Implement-ability	Cost, Life Cycle	Schedule Risk	SCORE
				2	5	3	3	4	
ABOVE GRADE									
A	Backhoe	FEL	Backhoe-forklift-FEL	2	2	1	4	5	49
	(both dribble)					tough to get equipment to drop station			
	(small bucket more x-contamination)								

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LARGE OPEN PRIMARY WITH PERMANENT WALLS							March 25, 2003	
D	Backhoe > 5x5x10 box	OH crane	backhoe-OH crane-Dirt Bin	4	3	3	5	61
		need 3 cranes/3 delivery points						
C	Backhoe > Box	forklift	Backhoe-forklift-FEL	3	2	3	5	51
D	Backhoe > Box	Backhoe > Roller Conveyor	backhoe-OH crane-Dirt Bin	4	2	0	5	0
						transport with backhoe prob		
E	Backhoe > Box	forklift > Roller Conveyor	backhoe-OH crane-Dirt Bin	4	3	1	5	55
F	Backhoe > Backhoe Rehandle	Hopper & Belt Conveyor	Backhoe-forklift-backhoe	2	1	1	5	41
G	OH crane with Hyd clamshell & Grapple	Hopper / Conveyor	Clamshell-OH crane-Dirt Bin	2	1	1	5	41
H	OH crane with Hyd clamshell & Grapple	Box / Crane / Conveyor	Clamshell-OH crane-Dirt Bin	2	3	1	5	51
I	Mob Crane with Hyd clamshell & Grapple	Box / Crane / Conveyor	Clamshell-OH crane-Dirt Bin	1	1	1	3	31
J	FEL/Backhoe Combination	FEL/Backhoe Combination	Backhoe-forklift-FEL	1	1	1	5	42
K	FEL/Backhoe Combination	Box / Crane / Conveyor	Backhoe-forklift-Dirt Bin-FEL	1	1	2	5	42
L	OH crane Z-mast - Cookie Cutter	Box / Crane / Conveyor	Cutter-OH crane-Dirt Bin	-	-	0	-	0

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LARGE OPEN PRIMARY WITH PERMANENT WALLS										March 25, 2003
D	All above grade with 3 walls in bldg & sheet piles in pit									
BELOW GRADE: May drive in sheet piles, but would have to leave them out in an area and use a curtain for a below grade door. Fabric roll-up door or a door that slides down after you have dug.										
AA	FEL & Backhoe	FEL	FEL-forklift-FEL				0			0
	(both dribble)									
BB	Backhoe > 5x5x10 box	OH crane to roller conveyor	backhoe-OH crane-Dirt Bin	1		1	1	1	5	33
CC	Backhoe > Box	forklift	backhoe-forklift-Dirt Bin-backhoe				0			0
DD	FEL & Backhoe > Box	forklift	backhoe-forklift-Dirt Bin-backhoe				0			0
EE	Hydraulic Shovel > Box	forklift	Sh'vl-forklift-Dirt Bin-Sh'vl				0			0
FF	Hydraulic Shovel > Box	OH crane to roller conveyor	Sh'vl-OH crane-Dirt Bin	3		3	1	1	5	47
GG	Bobcat Loader	Bobcat Loader	Bobcat-Forklift-Backhoe				0			0
HH	Bobcat Loader	forklift	Bobcat-Forklift-Backhoe				0			0
II	FEL/Backhoe Combination > Box	forklift	FEL/backhoe-forklift-FEL/backhoe				0			0
JJ	FEL/Backhoe Combination > Box	OH crane to roller conveyor	FEL/backhoe-OH crane-Dirt Bin	1		1	1	1	5	33

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D	LARGE OPEN PRIMARY WITH PERMANENT WALLS						March 25, 2003
KK	FEL/Backhoe Combination	FEL/Backhoe Combination	FEL/backhoe- forklift- FEL/backhoe		0		0
	Mobile equipment below grade will either need to ramp through the waste or be lifted in and out. The ramp would need to be removed, then rebuilt with clean materail. Mobile equipment becomes infeasible. Transporting needs to be done with crane. To get mobile equipment out, could use curtains to get to next section, but not much advantage over other options.						
	Below grade option would score about the same as one large primary if only 1 wall is used.						
	Scenario 1: Remove 3' of overburden. Walls hung from structure and extending down into material. Once you remove the waste, you have lost the seal for the section.						

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E SMALL MOVEABLE PRIMARY - LARGE SECONDARY March 25, 2003									
<p>Notes. Can't take mobile equipment from a moveable building. Equipment with boxes can be put into another box. Not enough room for a mobile crane. A crane has to be part of the moveable building. Small moveable primary either has its own airlock or you need a series of them. Whereever you come out, you need a series of airlocks. Crane is part of the primary. Box has to be wrapped or put into another box before you take out of area. With no sheet piles. Have angle of repose to deal with. Lining the excavated area is difficult in the beginning of operations. Sloughing is an issue. Have to be able to get the waste back in. Have to prepare the floor. Building may have to hang over one side of the pit. Hard to make this building bigger-get over the 2.5' piles and rails that are already there by Pit 7. Conclusion: Have to come in from the North by Pit 7 due to obstructions. Concern: Hard to seal the primary. Have to use a liner that is secured in the clean area. Have to did into clean overburded to secure the walls of the primary or a curtain of the primary. Idea: Have a 120' building and closing 60' of the area before the move.****For this evaluation assume the building is about 130 x 120 ft and has to move about 5 to 6 times. Line it and move. Don't fill in with treated waste before we move to keep excavation moving.</p>									
CRITERIA & WEIGHT									
ITEM	EXCAVATION	TRANSPORT	Floor-Waste Boxes-Dirt	Cross Contamination	Contamination Spread	Implement- ability	Cost, Life Cycle	Schedule Risk	SCORE
				2	5	3	3	4	
ABOVE GRADE									
A	Backhoe	FEL	Backhoe- forklift-FEL	2	2	0	4	2	0
	(both dribble)								
	(small bucket more x- contamination)								

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E	SMALL MOVEABLE PRIMARY - LARGE SECONDARY				March 25, 2003			
B	Backhoe > 5x5x10 box	OH crane	backhoe-OH crane-Dirt Bin	4	4	2	2	48
				Above grade. Few dribbling. Big loads and large bucket.	Relatively smaller HVAC system.	Moveable walls and liner. More risk of an accident. portable HVAC system. Has to operate some while moving. Have to keep things negative while you are moving.	Coordinate with treatment. Moving the building and proving it is sealed.	
C	Backhoe > Box	forklift	Backhoe-forklift-FEL	3	3	1	2	38
		Maneuverability issues. Extra equipment.			Building helps and forklift hurts. Driving over dirt.	Harder to maneuver the forklift.		
D	Backhoe > Box	Backhoe	backhoe-OH crane-Dirt Bin	3	2	0	2	0
E	Backhoe > Box	forklift	backhoe-OH crane-Dirt Bin	3	3	1	2	38
				Like C except return to Pit.				
F	Backhoe > Backhoe Rehandle	Hopper & Belt Conveyor	Backhoe-forklift-backhoe	2	1	0	2	0

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E	SMALL MOVEABLE PRIMARY - LARGE SECONDARY								March 25, 2003
	Dump in a pile.								
G	OH crane with Hyd clamshell & Grapple	Hopper / Belt Conveyor	Clamshell-OH crane-Dirt Bin	2	1	1	2	2	26
	The shoot would have to be part of the primary.				Dealing with a grapple and it is messy. Hard to keep conveyor sealed.	The interface of trying to bring material to conveyor and keeping conveyor sealed in its own primary won't work. Have to send people in to do this.			
H	OH crane with Hyd clamshell & Grapple	Box / Crane / Conveyor	Clamshell-OH crane-Dirt Bin	2	2	1	2	2	31
	Crane may have to be outside of primary.	Same as B	Same as G						
I	Mob Crane with Hyd clamshell & Grapple	Box / Crane / Conveyor	Clamshell-OH crane-Dirt Bin	1	1	0	2	2	0
J	FEL/Backhoe Combination	FEL/Backhoe Combination	Backhoe-forklift-FEL	1	1	0	2	2	0
K	FEL/Backhoe Combination	Box / Crane / Conveyor	Backhoe-forklift-Dirt	1	2	2	2	2	32

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E	SMALL MOVEABLE PRIMARY - LARGE SECONDARY								March 25, 2003
			Bin-FEL						
					FEL and building				
L	OH crane Z-mast - Cookie Cutter	Box / Crane / Conveyor	Cutter-OH crane-Dirt Bin	-	-	0	-	-	0
BELOW GRADE: Anything with mobile equipment with transport cannot be done below grade with moveable building.									
AA	FEL & Backhoe	FEL	FEL-forklift- FEL	5	3	0	4	5	0
BB	(both dribble) Backhoe 5x5x10 box	OH crane	backhoe-OH crane-Dirt Bin	1	2	2	2	2	32
CC	Backhoe > Box	forklift	backhoe- forklift-Dirt Bin-backhoe	1	1	0	2	2	0
						Mobile equipment below grade is impossible.			
DD	FEL & Backhoe > Box	forklift	backhoe- forklift-Dirt Bin-backhoe	3	2	0	2	2	0
EE	Hydraulic Shovel > Box	forklift	Sh'vl-forklift- Dirt Bin-Shvl	3	2	0	2	2	0
FF	Hydraulic Shovel > Box	OH crane	Sh'vl-OH crane-Dirt Bin	3	4	2	2	2	
GG	Bobcat Loader	Bobcat Loader	Bobcat- Forkloft-	1	1	0	2	2	0

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E SMALL MOVEABLE PRIMAKY - LARGE SECONDARY			March 25,2003					
		Backhoe						
HH	Bobcat Loader	forklift	Bobcat-Forkloft-Backhoe	1	1	0	2	2
II	FEL/Backhoe Combination > BOX	forklift	FEL/backhoe-forklift-FEL/backhoe	1	1	0	2	2
JJ	FEL/Backhoe Combination > Box	OH	FEL/backhoe-OH crane-Dirt Bin	1	2	2	2	32
KK	FEL/Backhoe Combination	FEL/Backhoe Combination	FEL/backhoe-forklift-FEL/backhoe	1	1	0	2	2
Scenario 1: After the building moves, the primary is a liner or flexible cover.								
Scenario 2: Move the building and extend the walls and have a flexible seal at the bottom.								
Scenario 3: You are always going to overlapping between 30 and 60 ft. You have to fill in the Pit before you move. May result in more moves (5-6 times at 90'). 120' building.								

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